II. Mercury

Mercury is highly toxic to humans and wildlife. It accumulates in the tissues of fish and other organisms inhabiting mercury-contaminated waters and builds up in the tissues of organisms higher up the food chain, including fish and subsequently, humans. Contamination of New Hampshire's lakes with mercury has resulted in fresh water fish advisories and in some cases, a complete ban on any consumption of fish, throughout the state. This contamination comes from airborne mercury, and is a problem all across the United States.

In humans, mercury is toxic to the nervous system, affecting the brain and spinal cord, and is also toxic to the kidneys and liver. Mercury exposure is particularly significant for young children and pregnant women because mercury easily crosses the placenta where it inhibits the development of the brain and the nervous system of the developing fetus. Lowered intelligence, impaired hearing, and poor coordination are some of the effects seen in children with elevated mercury exposure.

Approximately 98 percent of the mercury released into the air in New Hampshire comes form the combustion of fossil fuels, such as coal and oil, and the incineration of waste (municipal solid waste and medical waste). Mercury may also become airborne when mercury-containing products are improperly disposed of or accidentally broken. DES estimated in its 1998 *Mercury Reduction Strategy* (see below), that hospitals facilities with incinerators contributed approximately 9 percent of all airborne mercury in New Hampshire. The estimate was based primarily on 1997 data.

New Hampshire's Mercury Reduction Strategy

Adopted in October 1998, DES's *Mercury Reduction Strategy for New Hampshire* (www.des.state.nh.us/nhppp/merc20.htm) contains 40 recommendations for reducing man-made releases of mercury into the environment, including healthcare. Many of these recommendations involve P2 and focus on preventing mercury pollution, rather than trying to clean up mercury contamination after it becomes a problem.

Reducing Mercury Use and Liability

Healthcare facilities should eliminate or reduce their use of mercury wherever possible. This will reduce the amount of mercury going into the trash and/or being incinerated, and will reduce the amount of mercury waste that needs to be properly disposed. The best way to reduce mercury at any facility is to:

1. Take a facility-wide **inventory** and recycle/dispose any old mercury or mercury-containing items stored onsite.
2. Use **source reduction** techniques to eliminate mercury where possible.
3. Properly **manage the mercury** you cannot eliminate.

1) Inventory

Mercury-Containing Products at Healthcare Facilities

The first step to eliminating mercury at a healthcare facility is to identify where it is being used or stored. Conduct a survey or create an inventory of mercury-containing products throughout the facility. Broken mercury-containing items are often stored in the back of closets or in basement areas because employees are not sure how to properly dispose of them. Mercury can be found in

many items including: fluorescent bulbs, thermostats, tilt switches, relays, thermometers, gastrointestinal tubes, sphygmomanometers (blood pressure cuffs), vacuum gauges, manometers, and button batteries. Mercury is also used in laboratories as a reagent and catalyst for such tests as Chemical Oxygen Demand (COD), and in staining, fixative, and preservative applications.

- EPA: Mercury in the Environment – The Waste Connection
  www.epa.gov/grtlakes/p2/mercpam.html

- H2E Self-Assessment Guide
  www.h2e-online.org/pubs/selfasmt.pdf

- Instruments, Products, and Laboratory Chemicals Used in Hospitals That May Contain Mercury - Chapter 2-3 in Health Care Without Harm's *Going Green*
  www.noharm.org/library/docs/Going_Green_List_of_Mercury-Containing_Items_i.pdf.

- Medical Facility Mercury Survey
  www.uml.edu/centers/LCSP/hospitals/HTMLSrc/IP_Merc_Tools_Medfacility.html

Mercury Cleanout
Once you have identified the old or broken mercury-containing items that are stored at the facility (as well as other items that are universal or hazardous waste), you need to have them properly recycled or disposed of as hazardous waste. For a list of mercury recyclers that service N.H., see www.des.state.nh.us/nhppp/vendors.htm.

2) Source Reduction

The best way to keep mercury-containing products out of the waste stream is to purchase and use products that do not contain mercury. It is imperative to work with the facility's procurement staff so that once the mercury-containing items have been removed from the healthcare facility; they do not come back in through the loading dock! Talk to the purchasing director to see what mercury-free products are currently available, then talk to the group purchasing organization (GPO) and suppliers to request additional alternatives.

Fortunately, the use of mercury in medical and laboratory equipment and procedures is diminishing with the advent of non-mercury technologies (such as digital thermometers) and changes in laboratory practices, including conversion to micro-scale procedures. These source reduction techniques promise significant mercury reductions in New Hampshire as several healthcare facilities in the state have implemented a program for, or expressed interest in, going "mercury free."

- Eliminating Mercury Use in Hospital Laboratories: A Step Toward Zero Discharge
  www.noharm.org/library/docs/Eliminating_Mercury_Use_in_Hospital_Laboratori.doc

- Institute Best Management Practices
  www.uml.edu/centers/LCSP/hospitals/HTMLSrc/IP_Merc_How_InstBMP.html

- National Microscale Chemistry Center
  www.silvertech.com/microscale/index.html

- Protecting By Degrees: What Hospitals Can Do To Reduce Mercury Pollution
  www.noharm.org/library/docs/Protecting_by_Degrees_2.pdf

- Waste Reduction Activities For Hospitals
  www.ciwmb.ca.gov/bizwaste/factsheets/hospital.htm

Reducing Mercury Emissions by Reducing Red Bag Waste at N.H. Healthcare Facilities

The Red Bag Issue
When healthcare facilities investigate what is being discarded in their red bags, they almost always find a lot of items that could be disposed of in the trash as solid waste. NHPPP does not advocate slipping infectious waste into the trash, but red bags are often full of coffee cups and various types of non-infectious medical waste. Educating staff on the expense and environmental consequences of red bag waste disposal is the first step in reducing the amount of red bag waste generated at your facility. Successful red bag reduction programs have shown that the amount of red bag waste and associated disposal costs can be cut significantly. One example is Elliot Hospital's red base waste reduction program.

Red Bag Reduction: Significant Savings at Elliott Hospital
Prior to starting the reduction program, 50 percent of their clinical and lab waste ended up in bed bags. After the program was implemented, only 10-15 percent of the waste was red bagged, for a six figure annual cost savings.

A host of literature and case studies exists on reducing red bag waste and costs, some of which can be found at:

- 10 Ways to Reduce Regulated Medical Waste
  Health Care Without Harm's Going Green Chapter 4-2
  www.noharm.org/library/docs/going_green_4-2_10_Ways_to_Reduce_Regulated_Me.pdf

- Products and Resources for Category: Infectious Waste (Red) Bags
  www.sustainablehospitals.org/cgi-bin/DB_Report.cgi?px=W&rpt=Cat&id=24

- Waste Reduction Guide: Cutting Costs & Minimizing Waste From Your Facility – Section 7: More About Regulated Medical Waste
  www.h2e-online.org/pubs/wrguide/section7.pdf

Another Reason to Reduce Red Bag Waste: Cadmium
Reducing your red bag waste will not only reduce mercury emissions, but also reduce cadmium emissions if your bags are incinerated (on- or off-site). The red dye in "red bags" sometimes contain cadmium; therefore when incinerated, cadmium emissions can cause air quality and health issues. Long-term exposure to low levels of cadmium can cause kidney disease, lung damage and fragile bones. A better option is to use cadmium-free red bags.
Information on red bags that **do not** contain cadmium can be found at Sustainable Hospitals website at: www.sustainablehospitals.org/cgi-bin/DB_Report.cgi?px=W&rpt=Haz&id=9.

Mercury-free Alternative Products Are Available For Healthcare Facilities
Healthcare facilities can reduce their use of mercury by replacing mercury-containing instruments (like thermometers and sphygmomanometers) with non-toxic alternatives. Many healthcare facilities have done this already, in response to the exorbitant cost of mercury spills, or to reduce their liability. High quality, workable alternatives already exist for most mercury-containing products and many hospital suppliers/vendors carry these alternatives.

- Mercury Reduction (alternative product listings)
  www.uml.edu/centers/LCSP/hospitals/HTMLSrc/IP_Mercury.html

- Four ways to find alternative products
  www.sustainablehospitals.org/cgi-bin/DB_Index.cgi.

Incineration of Infectious Waste
Recent hospital/medical/infectious waste incinerator (HMIWI) closings have eliminated the majority of mercury emissions coming directly from healthcare facilities in the state. As of April 2002, there have been only two operating HMIWI's in New Hampshire; however, much of the infectious waste generated at the other NH healthcare facilities is still incinerated off-site/out-of-state. In general, more waste is treated by incineration than is required by law. HCWH recommends that the incineration of healthcare facilities' wastes should be limited to the relatively small portion of regulated medical/infectious waste for which incineration is legally and medically required as the only treatment method. DES strongly supports this recommendation. Please see *Section IV: Issue with Incineration* for a more detailed discussion of incineration and alternative technologies.

3) Proper Mercury Management

Even with the best of efforts, it may not be possible to get rid of absolutely all the mercury in a facility. If using products that contain mercury, **all** appropriate facility personnel must be trained to ensure that these items are recycled or disposed of properly, so they do not end up in red bags, where they could be incinerated or autoclaved. Often only "key" personnel are trained, and the information does not make it down to all of the staff that uses red bags for waste disposal.

In addition, ensure that the facility has mercury spill cleanup kits on hand located near where mercury products are used and that staff are trained on how to properly clean up mercury spills. Emergency contact information in case of a spill should also be posted nearby.

The following sites contain information on how to clean-up mercury spills. If you do have a mercury spill, it needs to be reported to the state. Immediately call DES's Special Investigation Unit at 603-271-3899, from 8-4:00 Monday through Friday, or after hours, contact the State Police at 1-800-346-4009.

- Mercury Reduction: Spills
  www.uml.edu/centers/LCSP/hospitals/HTMLSrc/IP_Merc_BMP_Spills.html

- Cleaning Up Small Mercury Spills
  www.michigan.gov/deq/1,1607,7-135-3585_4127_4175-11751--,00.html

Hazardous and Universal Waste Rules
Most healthcare facilities generate some amount of hazardous waste and are consequently subject to New Hampshire's Hazardous Waste Rules, which can be found at www.des.state.nh.us/hwrb/hwrules.pdf. Each facility must properly manage its mercury-containing and other hazardous wastes. Most healthcare facilities are well aware of these requirements. However, a clarification of universal waste is presented below.

Spent mercury-containing products may be managed as **universal waste** if they are recycled, or as **hazardous waste** if they are disposed. Hazardous wastes are managed under the Resource Conservation and Recovery Act (RCRA) and the *N.H. Hazardous Waste Rules*. Universal wastes are wastes that meet the definition of hazardous waste in the *N.H. Hazardous Waste Rules*, but during accumulation and transport, pose a relatively low risk compared to other hazardous wastes. Wastes that DES has determined meet universal waste criteria include mercury-containing lamps and devices, used antifreeze, certain types of batteries, cathode ray tubes, and recalled or suspended hazardous waste pesticides regulated under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

Generally, it is easier and cheaper to manage a waste as a universal waste. Regulations governing universal waste are less stringent than those governing hazardous waste. That said, universal wastes must be stored properly to prevent release, labeled correctly, and self-transported or shipped with a Bill of Lading offsite. For information on universal wastes, see DES's fact sheets at:

- Mercury Containing (Universal Wastes) Devices: Management Requirements for Handlers and Transporters
  www.des.state.nh.us/factsheets/hw/hw-17.htm

- Best Management Practices for Mercury-Containing Products in the Hospital
  www.uml.edu/centers/LCSP/hospitals/HTMLSrc/IP_Merc_BMP.html

A Word on Fluorescent Lamps

Fluorescent lamps should not be placed in the trash, and must be handled as either a hazardous waste or as universal waste. **All fluorescent lamps contain mercury and should be recycled.** Some lamps are sold as "non-hazardous" (commonly referred to as "green-tip" lamps) and can legally go in the trash if they pass hazardous waste testing, known as Toxicity Characteristic Leaching Procedure, or TCLP; however DES highly discourages this practice, because these lamps still contain about 10 mg of mercury each. Additionally, it has been anecdotally reported that these lamps burn out more quickly than regular fluorescent lamps, thus releasing just as much mercury into the environment (per area or per ballast) as regular fluorescent lamps. Please note that lamp crushers must obtain a permit or go through the waiver process with DES's Hazardous Waste Compliance Section.

Non-profit healthcare facilities are eligible to use the State of New Hampshire's fluorescent lamp contract. To receive a copy of the contract or the current rate of fluorescent lamp recycling or to purchase a reduced rate spill kit, contact NHPPP at 603-271-2956.

- Universal Waste Lamps: Management Requirements for Handlers and Transporters
  www.des.state.nh.us/factsheets/hw/hw-7.htm

- Fluorescent Lamp and Ballast Recycling Facilities
  www.des.state.nh.us/pcas/lamplist.htm

Basically, it's a lot easier and cheaper to reduce your mercury through source reduction than it is to worry about its proper handling and disposal.